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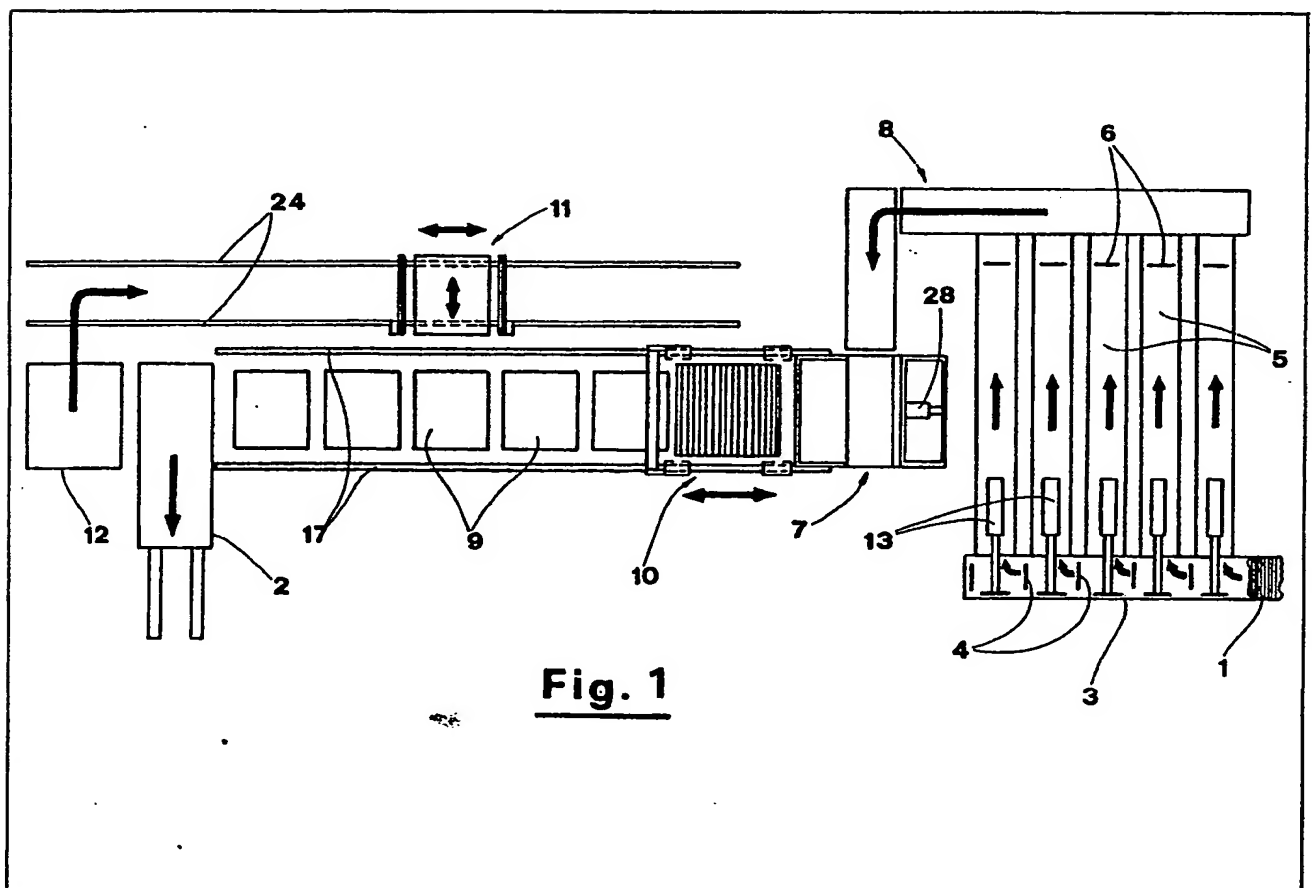
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(54) Apparatus for palletising different articles

(57) The invention relates to automatic palletising plant for differently categorised articles, which stacks the latter layer-by-layer onto wooden pallets. The articles arrive via an incoming conveyor (1), and having been identified according to category are sent likewise according to category onto respective bunker, or accumulator conveyors (5) where

they sit until sufficient in number to make up one pallet-layer. A set of articles thus accumulated will then proceed forward to a squaring-device (7) which marshals them into the appropriate layer format before being collected by a first traverser (10) whose function it is to set such layers down in turn on the appropriate pallet, according to category, at a series of fixed palletising-bays (9). Provision is made further for a second traverser which collects full pallets from these bays and despatches them onto an outgoing conveyor (2) before replenishing the bay thus vacated with a fresh pallet duly picked up from an additional supply bay.



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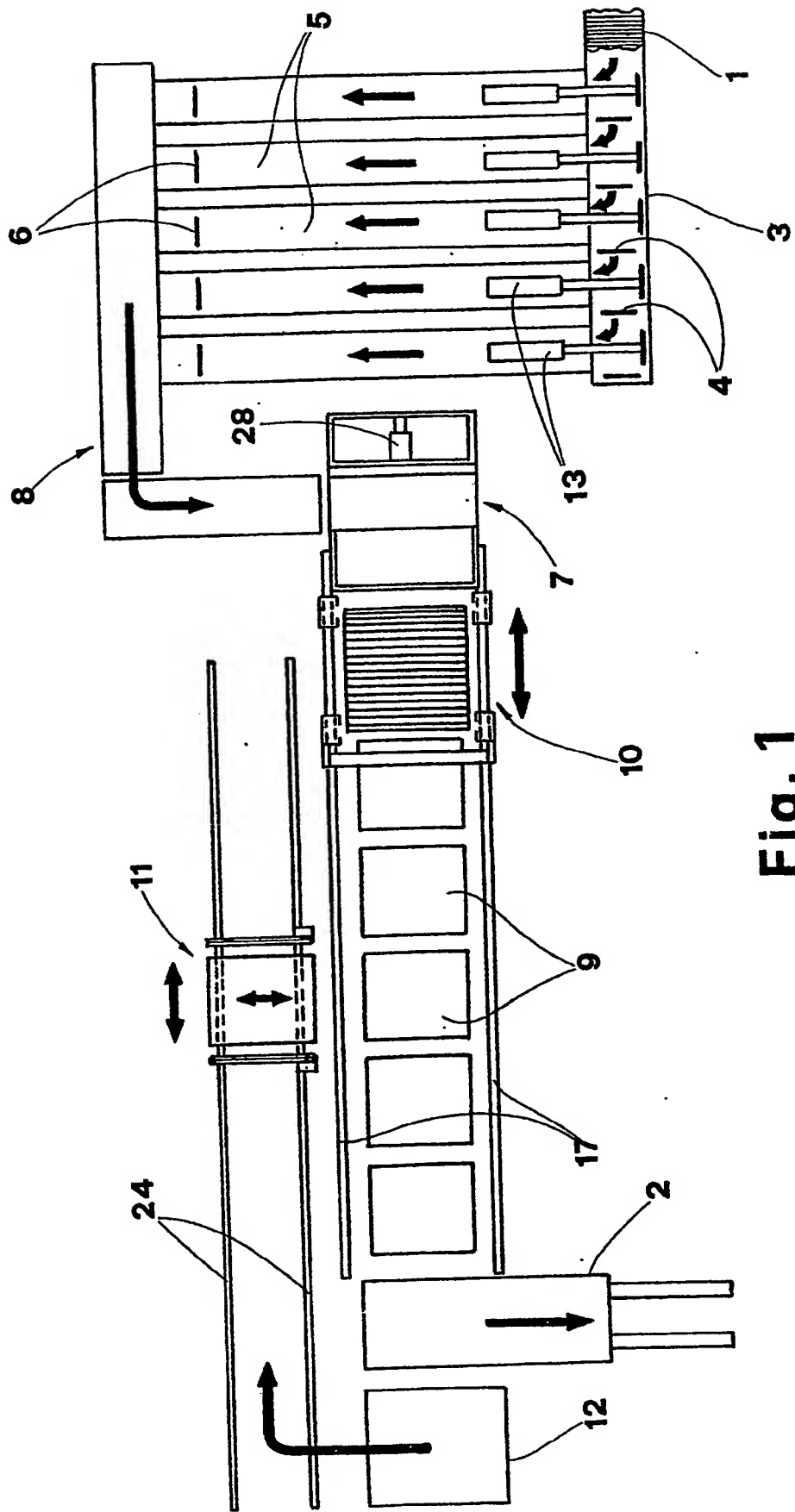


Fig. 1

Fig. 2

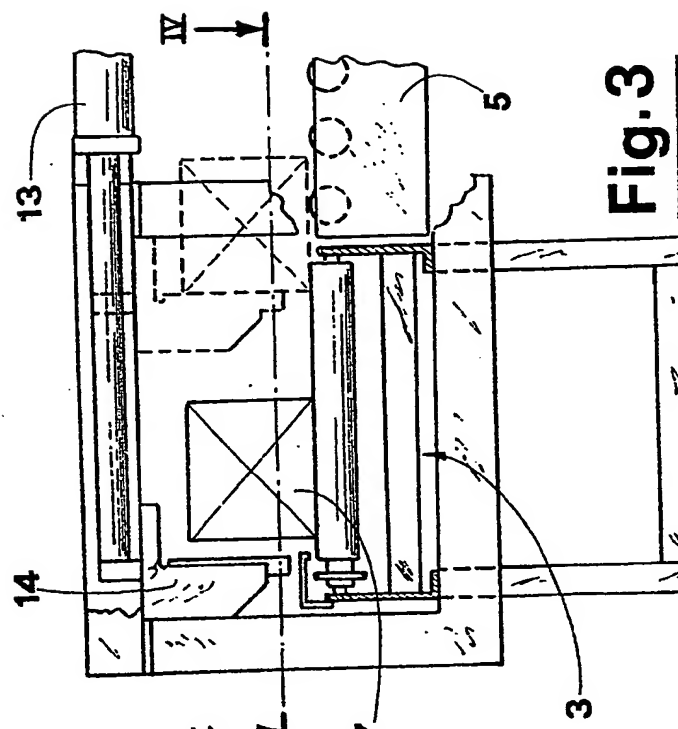
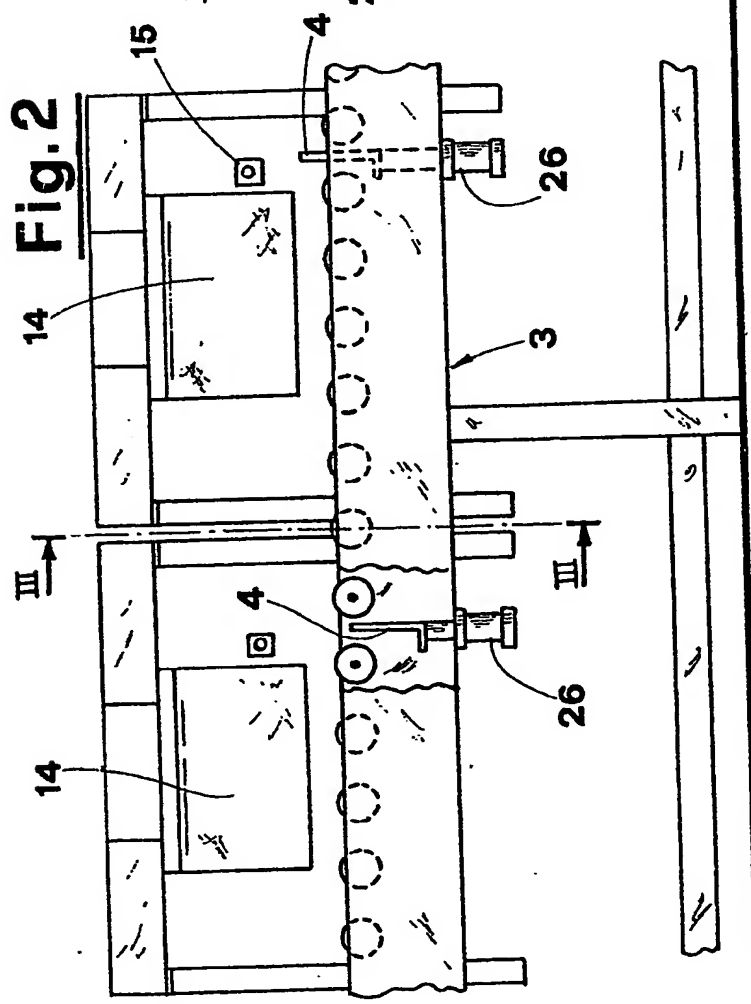


Fig. 3

Fig. 4

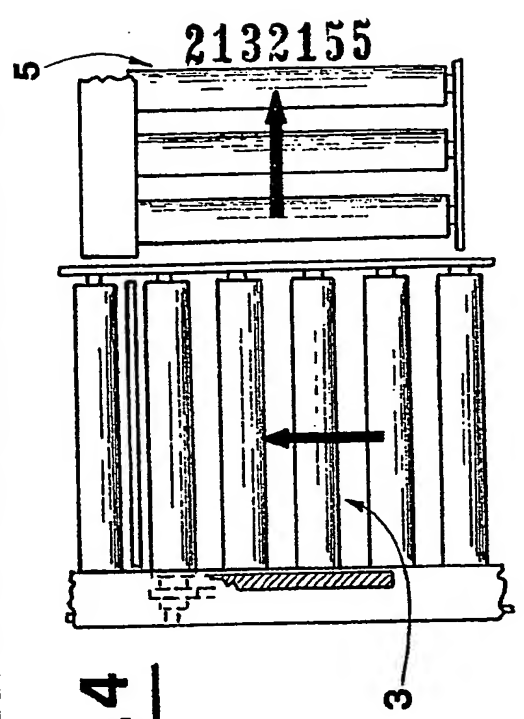


Fig. 5

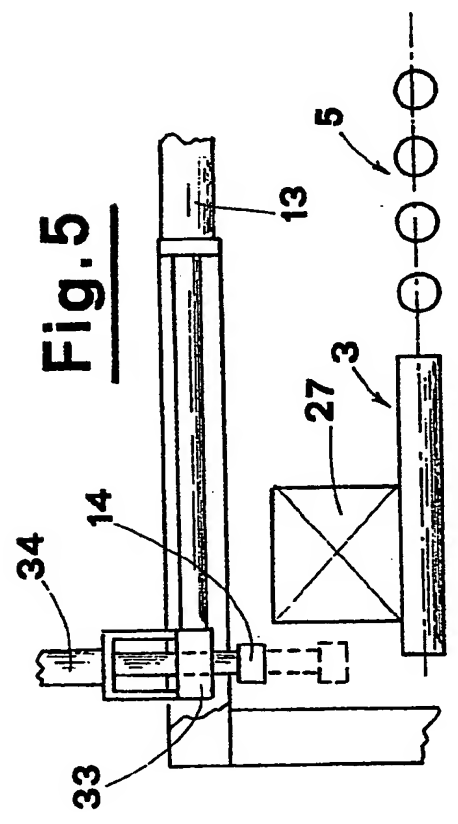
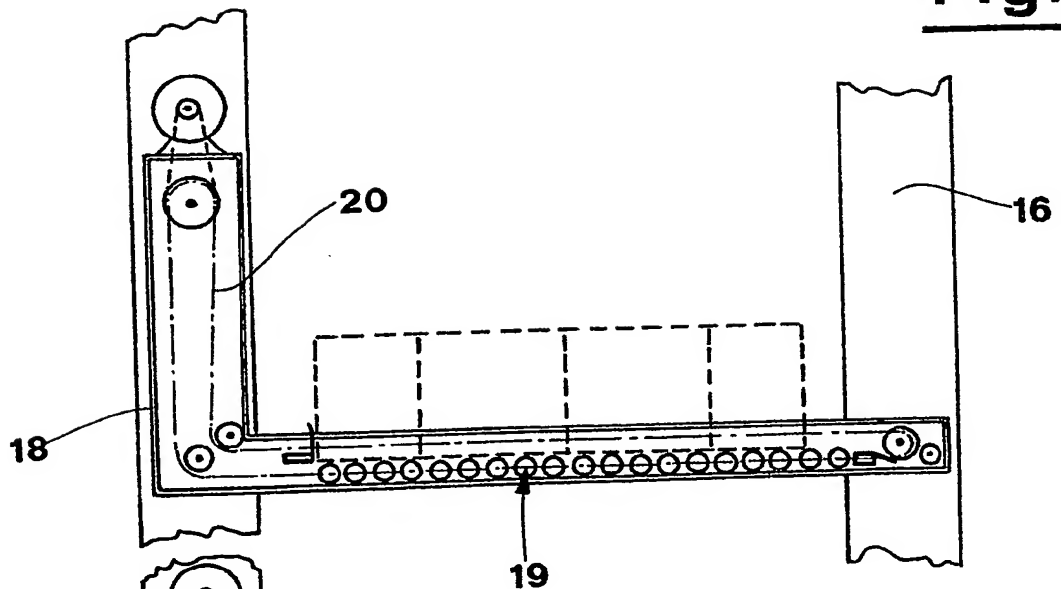
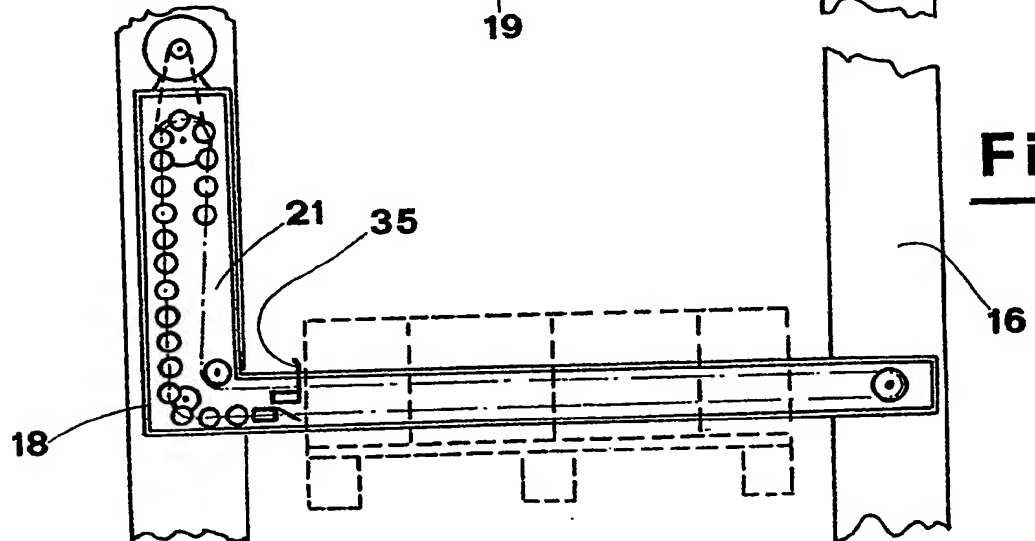
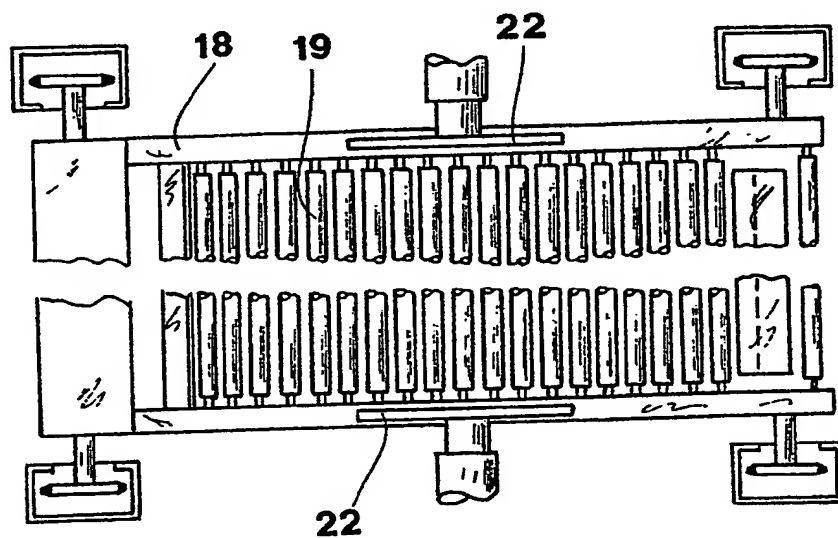


Fig. 6**Fig. 7****Fig. 8**

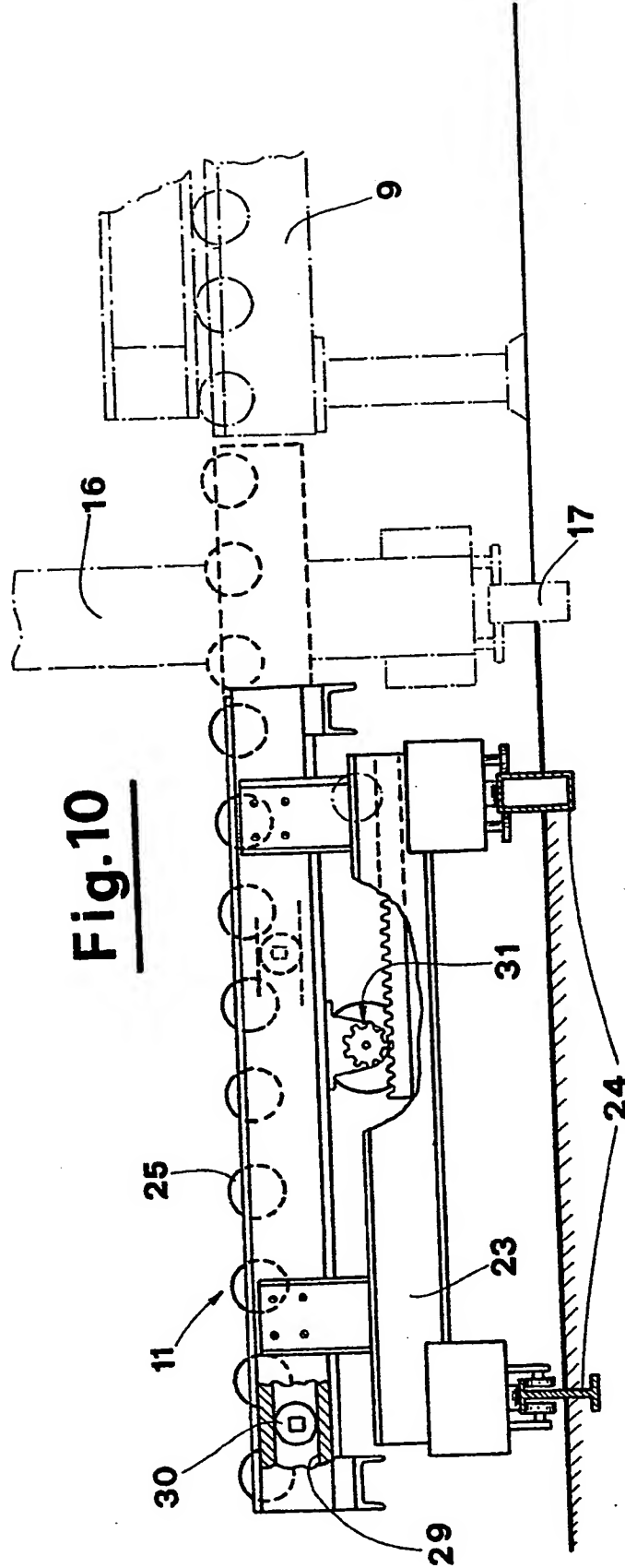


Fig. 10

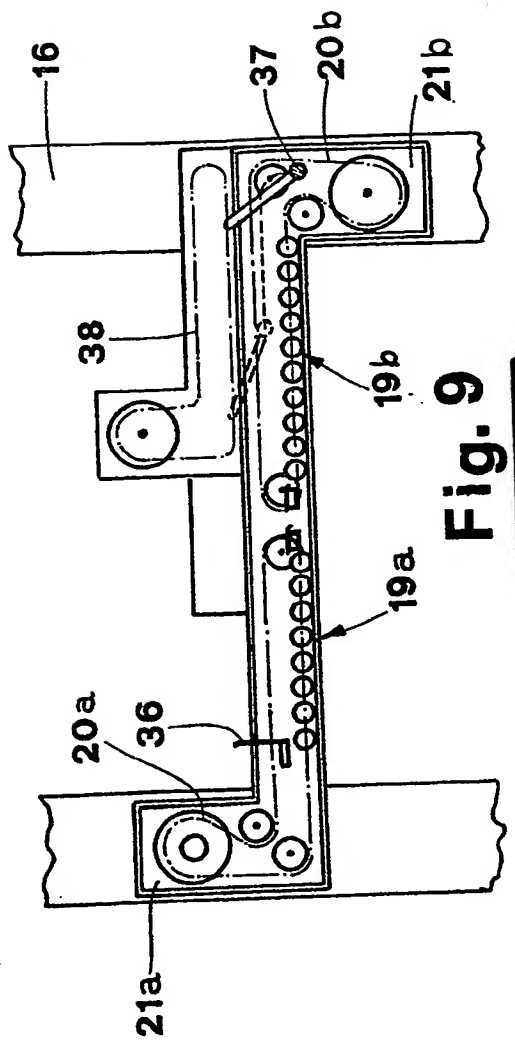


Fig. 9

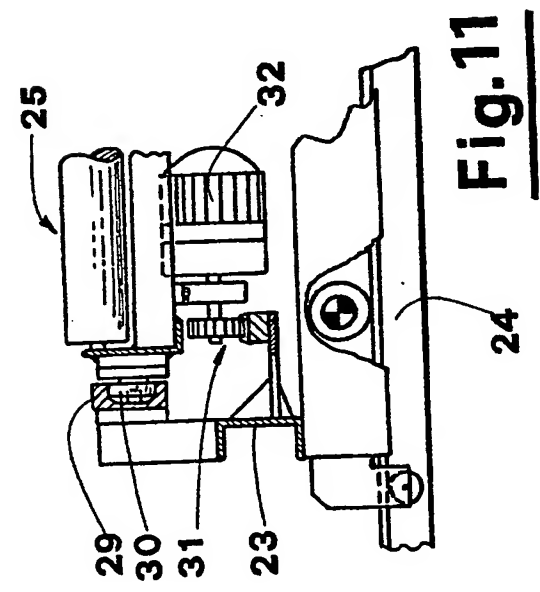


Fig. 11

SPECIFICATION

Automatic palletising plant for differently-categorised articles

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The invention described herein relates to automatic plant for palletising articles according to type.

10 The requirement for a system of palletising goods according to type as they exit from respective packaging lines is common enough, especially in large factories. The solution is generally provided in such instances either by linking-up a single palletising-unit
15 per line-exit, or by installing 'bunkering' or stock-piling facilities such that articles coming off the packaging lines can be set to one side and then picked off in sufficient number to make up a pallet as and when palletising-flow permits. With this arrangement, a single pal-
20 letising-unit can serve a number of single bunker facilities.

The first method as described is one which clearly involves a high capital and running
25 outlay. The second is one calling for a great deal of space, since stock-piling facilities will be large—particularly if pallets are to be well-stacked in terms of cubic measure.

The object of the invention as described
30 herein is that of overcoming these drawbacks, providing palletising plant such as will be economical, such as will save space in installation, and such as will provide good flexibility when operational.

35 A further object of the invention is that of setting forth palletising plant whose operation is totally automatic.

These objects, and others besides, are realised by the palletising plant to which the
40 invention relates—viz, of the type designed for stacking goods layer-by-layer on wooden pallets, and comprising an incoming conveyor up-line of the plant itself supplying the articles for palletisation; and an outgoing conveyor
45 down-line of the plant onto which finished pallets are despatched, characterised in that it comprises:

—an identification device positioned up-
50 line of the plant designed to single out categorised articles and supply the plant with control signals according to type;

—an entry conveyor onto which articles arrive from the incoming conveyor aforementioned, provided with a number of stops—the
55 number corresponding to the number of type-categories being handled—kept normally disengaged, and moved into an engaged position on receipt of an appropriate control signal from the identification device as aforesaid;

60 —a number of bunker-conveyors corresponding to the number of article-categories being handled, whose first ends abutt with the side of said entry-conveyor at respective points slightly forward of said stops, such that
65 draw-off of articles along each bunker-con-

veyor comes about at right-angles to movement of same along the entry-conveyor, and whose remaining ends are furnished with respective check-devices kept normally in the engaged position;

70

—a number of draw-off means,—corresponding to the number of article-categories being handled, each of which designed to draw a categorised article off said entry-conveyor and onto said corresponding bunker-conveyor;

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—a number of counter-devices—one to each bunker-conveyor—designed to enumerate articles in transit on the latter and relay a
80 relative signal which triggers disengagement of said respective check-device and on-going movement of articles checked thereby from said bunker-conveyor, each time the article-count reaches a given number required to

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form one pallet-layer;
—a squaring-device designed to arrange articles into the required pallet-layer format and communicating with said bunker-conveyors via a further, linking-conveyor,

90 —a doublecheck counter-device designed to relay a signal enabling disengagement of said check-devices and movement forward of articles from said bunker-conveyors each time the number of articles required for formation
95 into one pallet-layer runs off said linking-conveyor;

—a number of fixed bays corresponding to the number of article-categories being handled, each of which accommodating a
100 single pallet onto which layers aforesaid of a given category are set down in succession one on top of the other;

—a first traverser which brings the arranged layer of articles from the squaring-device to the bay allocated for that particular
105 article, and deposits said articles thereon;

—a second traverser which collects full pallets from said bays and transfers them to the outgoing line aforementioned—the same
110 second traverser also designed to pick up empty pallets from a further supply bay and deposit them at said fixed bays when vacated following collection of said full pallets.

The invention will now be described—by
115 way of example, with reference to the accompanying drawings, in which:

—Figure 1 is a plan of the palletising plant to which the invention relates;

—Figure 2 is a vertical elevation of the
120 entry-conveyor with certain parts cut away the better to reveal others;

—Figure 3 is a section through III–III, Fig. 2;

—Figure 4 is a section through IV–IV in
125 Fig. 3, giving further illustration of said entry-conveyor;

—Figure 5 shows a variation in possible embodiment of the entry-conveyor draw-off means;

130 —Figure 6 is a vertical section through the

palletising plant's first traverser, which shows the traverser-platform occupied by its bearer-rollers;

- 5 —Figure 7 is the same view as in Fig. 6, showing the palletising traverser as vacated by said bearer-rollers;

6; —Figure 8 is the view from above of Fig. 6;

- 10 —Figure 9 shows a different method of embodying the first traverser platform as seen in section in Fig. 6;

- 15 —Figure 10 illustrates the second traverser—and more precisely, its carriage-mechanism, which is seen face-on to the direction of movement with certain parts cut away the better to reveal others; also shown in broken line is an upright forming part of the surrounding frame, and part of one of the palletising-bays;

- 20 —Figure 11 shows part of the carriage-mechanism aforesaid in section, taken through X-X, Fig. 10.

- 25 With reference to the drawings, the palletising plant described herein is connected to a number of packaging machines not illustrated in the disclosure, by way of an incoming conveyor 1. Each of said packaging machines will turn out articles of a given category, and deposit them on the incoming conveyor, 30 which duly brings the entire output into the palletising area.

- Provision is made for an identification device (this too, not in fact illustrated) located up-line of the plant, which identifies each 35 incoming article in turn, and relays an appropriate signal—different for each article-category being handled—forward to said plant.

- The identification device might be of a number of different types—e.g.: a reader located immediately prior to entry, capable of 40 identifying special labels attached to the articles—which would be varied according to each of the categories being handled, needless to say; or perhaps a programmed-output 45 control triggered by the packaging machines themselves, which would supply articles to the palletising plant in ordered sequence, hence 'identified' well before entry. Whichever type were to be selected, all such 50 devices would be known to a man skilled in the art.

- Returning to the drawings, the plant comprises an entry-conveyor 3 connected-up to said incoming-conveyor 1 so as to receive 55 articles therefrom for palletising.

- Conveyor 3 is of the motorised-roller variety, and is furnished with a number of stops 4 disposed within planes normal to the direction of movement along the conveyor 60 itself 3, said stops remaining below the level of the conveyor-surface in their normally-disengaged position so as not to obstruct the flow of articles above, and caused to move through a vertical path—driven by an actuator cylinder 26, for instance—which will 65

bring them into a 'stop' position as illustrated in Fig. 2, above the level of entry-conveyor 3 actually travelled by incoming articles.

- The stops 4, which are equal in number to 70 the number of article-categories being handled in production, are controlled by signals relayed from the identification device, so that each will be caused to raise by a respective category-related signal determined beforehand. 75

- Provision is made further for a number of bunkering conveyors 5—once again equal in number to the number of article-categories being handled in production—disposed with 80 their first ends abutting one side of said entry-conveyor 3 such that draw-off of articles along each said bunker-conveyor 5 comes about at right-angles to movement of same along said entry-conveyor 3, said first ends being located 85 marginally forward of—i.e. anticipating, a respective stop 4. The remaining ends of said bunker-conveyors are provided with respective check-devices 6 which consist of a roller movable through a vertical path.

- 90 Unlike stops 4, these check-rollers 6 are utilized in a normally-engaged position, above the level of bunker-conveyors 5 travelled by said articles, such that these will come up against the check 6 and be thus impeded 95 from travelling further along said bunker-conveyor 5. From this raised position, said check-rollers 6 will periodically be moved into a position aligning with the bunker-conveyor 5 roller-bed so as to remove the impediment 100 from the path of articles travelling thereof (exactly how this comes about will be described in due course).

- Bunker-conveyors 5 are thus of the roller-bed variety, and the motorised rollers are each 105 fitted with a freewheel device permitting their operation either as driving or idle members, according to requirements which will also be explained in due course.

- In order to bring about passage of articles 110 from entry-conveyor 3 to bunker-conveyors 5, a number of draw-off means each consisting of a pneumatic actuator cylinder 13 with a flat blade 14 attached to its rod-end, can be operated such that said blade 14 rides over 115 the surface of said entry-conveyor 3 normal to the articles' path of movement thereon, drawing the single article with it, off conveyor 3 and on to conveyor 5. Fig. 3 illustrates this movement of blade 14, showing its position 120 in broken line during draw-off proper of the article in question—for the purposes of illustration in this instance, a package denoted 27. Provision may be made further for blade 14 itself to slide vertically with respect to an 125 appropriate fitting 33 made fast to the rod of cylinder 13 aforementioned, as in Fig. 5; thus, during the draw-off stroke, the blade can be kept lowered at the level necessary to transfer of the article from conveyor 3 to 130 conveyor 5, whilst on the return stroke it can

be raised—by means of a further pneumatic cylinder 34, for example—so as to clear the way for other articles passing along said conveyor 3 at that point; a feature not provided by the fixed blade 14, and one permitting of increased flow along the conveyor, hence higher production tempo and ultimate productivity of the palletising plant as a whole.

Each of the stops 4 on conveyor 3 is provided with a relative transducer 15—a photocell, for instance—which on reading the presence of an article latterly come up against said stop 4, relays a control signal bringing about actuation of cylinder 13 and, in consequence, draw-off of the article in question from conveyor 3 onto conveyor 5. In need hardly be said that this operation will need to be enabled by the appropriate category-identifying signal, since a signal relayed by transducer 15 actuating draw-off cylinder 13 will only be forthcoming following its corresponding stop 4 being raised into position on receipt of the relevant instruction from the identification device. This logic prevents unwarranted movement of draw-off cylinders 13, hence of their blades 14, which might otherwise occur on passage-through of an article allocated to the next stop in line, or those beyond.

Provision is made for counter-devices on the bunker-conveyors 5, these of conventional type and distributed one to each said conveyor 5 so as to count off the number of articles travelling the conveyor itself. Each counter will generate a signal by means of which to enable disengagement of the check-device fitted to its particular conveyor, enabling ongoing movement of the articles off the conveyor at the same moment, this signal duly being provided by the counter each time the number of articles aforesaid reaches that required to form one pallet-layer. The number of articles determining such a signal will be dependent on size, naturally enough, of single articles being palletised.

Articles running-out from the bunker-conveyors are propelled forward by a linking-conveyor toward a squaring-device 7 whose function is that of rank-and-filing said articles into single pallet-layers. Both linking-conveyor and squaring-device are conventional, and the number of separate operations required from the latter in forming a pallet-layer will plainly depend on the number and size of single articles composing same. Ongoing movement of the articles having left the bunker-stage—between conveyor 5 and device 7, that is—is rendered smooth and sweet by virtue of devices which turn the articles themselves, and of fences provided by idle rollers positioned with axis vertical at those points where change in the direction of said ongoing movement is envisaged. To reiterate, all such components in the linking-conveyor will be well known to a man skilled in the art. The squar-

ing device 7 is provided with shunt means 28, similar to the draw-off means aforesaid, which will propel forward each said pallet-layer formed by the squaring device once complete.

Provision is made further for a doublecheck counter-device—not illustrated in the drawings, but of a known type utilising photocells, for instance—which will relay a signal each time the number of single articles required to form one pallet-layer has passed along said linking-conveyor 8 to the squaring-device; said signal enabling disengagement of the check-devices aforesaid 6, as well as movement forward of further articles from said bunker-conveyors 5. Thus, disengagement of a single check-device 6 and a movement-forward of articles from the same bunker-conveyor 5 will only be enabled once said linking-conveyor 8 is vacated, and the requisite number of articles for one pallet-layer has accumulated on that same conveyor 5. The pallet-layer shunted forward meanwhile from said squaring device 7 will be made up of articles belonging to a single category, this easily identifiable since the articles are known to have exited from a given bunker-conveyor 5.

A number of fixed palletising bays 9 are located down-line of said squaring-device 7, these being equal in number to the number of article-categories being handled, and consisting to all intents and purposes of a motorised roller-bed. A pallet is positioned on each one of the latter, and layers as aforesaid duly deposited one on top of the next at each bay thus prepared, according to category.

Palletising plant as described herein also comprises a first traverser 10 which collects formed pallet-layers from said squaring-device 7 and brings them on to one of the fixed bays 9 aforesaid, according to category. The traverser 10 itself consists basically of a framework, or chassis with uprights 16 rendered capable of motion along first parallel guide-rails 17 which are laid such as to flank said fixed bays 9 at either side, as will be seen when observing Fig. 1. Thus traverser 10 moves back and forth directly over said fixed bays 9.

Provision is made for a bearer-frame 18 to slide up-&-down said chassis-uprights 16, whose platform consists of a bed of idle rollers 19. These idle bearer-rollers 19 move bodily within said bearer-frame 18 such as to alternate between a first position (shown in Fig. 6), where the traverser platform is occupied by the bearer-rollers, and a second position (shown in Fig. 7) where the traverser platform is vacated by rollers 19. To permit bodily movement as aforementioned, the single bearer-rollers are attached at either end to each one of a pair of chains 20 which when operated, wind around into a compartment 21 incorporated into the bearer-frame at one side of said platform.

Provision is made further for means of alignment 22 mounted to said bearer-frame 18 and consisting of a pair of plates or side-fences, as in Fig. 8, disposed one facing the other and brought together or drawn apart by actuator cylinders, the function of said means of alignment being that of rendering pallet-layers uniform in terms of size once on the bearer frame, keeping the maximum relevant horizontal dimension correct as the pallet fills up, and more important still, keeping the stacked layers perfectly upright. Also envisaged is a permanent fence 35 designed to impede articles sitting on said bearer-rollers 19 from following same when wound into the compartment 21.

Fig. 9 shows a further possible method of embodying bearer-frame 18—and more especially, its rollers 19. In this instance, the roller-bed itself is split into two sections 19a and 19b, the rollers being attached to two respective pairs of chains 20a and 20b which, when worked, wind into respective compartments 21a and 21b which will be located at either end of the traverser platform provided by said bearer frame.

In the embodiment thus suggested by Fig. 9, sections 19a & 19b of the roller-bed will be wound off in opposite directions, and, since each section occupies only a half of the platform overall, the latter will be vacated that much faster than in the wind-off illustrated by Figs. 6, 7 and 8, even though the second of the two embodiments would involve a less straightforward type of construction. The embodiment illustrated in Fig. 9 also incorporates a permanent fence 36 similar in all respects to fence 35 aforedescribed, and in addition, one has a movable fence 37 which during palletising proper will assume the position illustrated in Fig. 9, whilst following completion of each layer, the chain-loop denoted 38 draws it up-and-over as illustrated by the broken line in Fig. 9 so as to settle the articles fully one on top of the next. This same movable fence 37 also serves to impede articles sitting on said section 19b from following-on when the rollers thereof are wound into compartment 21b during set-down.

The accompanying drawings either include purely schematic representations of drive-systems, or omit them altogether for simplicity's sake. For instance, the type of drive used in traversing chassis-uprights 16 along guide-rails 17, and in moving bearer-frame 18 up-and-down said uprights, as well as that winding rollers 19 by way of chains 20, will be perfectly well-known to a man skilled in the art, as will their possible method of application.

Provision is also made for height-sensing means at each bay 9—likewise well-known—which read-off the maximum height necessary for set-down on top of the layers already stacked, and which generate a propor-

tional control signal geared to said maximum height utilised to trigger vertical movement of said bearer-frame 18 with respect to said uprights 16 and cause same to cease on arrival at a level slightly in excess of said maximum height. Compared to the less streamlined method simply of raising the bearer up to full height at each collection and then lowering its contents to the level required at a given bay—and there is nothing to prevent such a system being adopted—the proportional control described above clearly permits of saving production costs both in terms of energy and in terms of down-time.

The height-sensing means thus described can be carried into effect, say, by memorising the individual number of set-down manoeuvres completed by traverser 10 so as to arrive at the pre-established number of layers per bay 9, thereby arriving at maximum pallet-height. Clearly, some form of reset-to-zero system will need to be incorporated to operate each time a full pallet vacates its bay 9.

Palletising plant as set forth herein further comprises a second traverser 11 designed to collect filled pallets from the single bays 9 and transfer them to an outgoing line or conveyor 2. This transverser 11 basically consists of a trolley 23 running on second guide rails 24 set out along one side of said bays 9 and said outgoing conveyor 2. The trolley itself 23 is provided with a sliding platform 25 consisting of motorised rollers and caused to slide with respect to said trolley 23 on shoes 30 running within guides 29—guides and trolley being immovably associated. Movement of said platform 25 with respect to said trolley 23 is provided by a motor 32 plus rack-and-pinion drive 31. Drive-components providing movement of the traverser itself—i.e., of trolley 23 along guide-rails 24—are omitted for the sake of simplicity.

An additional function of traverser 11 is that of picking-up empty pallets from a further bay 12, whence to convey them to palletising bays proper 9 upon vacation thereof by full pallets. This supply-bay 12 will, needless to say, be located alongside said guide-rails 24 such as to afford the traverser-trolley 23 easy access.

Function of the palletising plant as thus described, is as follows: articles to be palletised—packages 27 for instance, of any given shape and size—arrive at the plant's entry-conveyor 3 having previously been identified by the identification device, whereupon the latter will have generated a signal occasioning movement upward of one of stops 4—the stop immediately down-line of that junction with conveyor 3 created by abuttal of whichever bunker-conveyor 5 is allocated to receive the identified article. At the same moment, the bunker-conveyor's draw-off cylinder 13 is enabled and prepares to actuate. With the article up against the raised stop 4, transducer

15 generates a signal to trigger operation of the draw-off cylinder 13, whereupon blade 14 imparts cylinder-movement to the package 27, propelling it onto bunker-conveyor 5. At this stage, the rollers of conveyor 5 will be turning idle, thanks to the freewheel facility aforementioned.

The steps thus far will repeat after the same fashion for each individual article category-identification and relative conveyor 5.

Once conveyor 5—whichever one—is in receipt of a number of articles sufficient to make up a pallet-layer, the relative counter-device will trigger start-up of the conveyor 5 rollers in motorised mode so as to propel the accumulated articles along the conveyor to the far end, where they will come up against the check 6—which will be lowered upon receipt of the appropriate enabling signal at the same moment, according to conditions. Should the signal be given, check 6 will lower, and articles can pass along to the squaring-device for formation into the appropriate pallet-layer format; should the counter-device not give the signal, then the articles remain up against the raised check 6 until such time as the signal is in fact forthcoming.

This system of bunkering and feeding-through articles in sufficient number to make up a single pallet-layer at a time—rather than an entire pallet—means that the actual bunker-conveyors 5 can be kept to considerably smaller dimensions than otherwise would be the case, with the result that palletising plant as a whole can offer space-saving advantages—and these advantages increase in importance the greater the number of layers per pallet; in other words, the more shallow the article, the greater the space-saving advantage.

Once the accumulated articles, all of one categorised type as aforesaid, have been shaped into the appropriate pallet-layer format by squaring-device 7, they are pushed forward thus by shunt means 28 onto the roller-bed 19 offered by bearer-frame 18—this forming part of first traverser 10 as aforesaid—at the moment in which the traverser is found alongside said squaring-device 7 with its bearer platform occupied by said rollers 19 and positioned on a level with the squaring-device's own bearer-surface.

The bearer frame now climbs the traverser uprights 16 up to whatever level is indicated by the height-sensing means aforesaid, and the traverser itself sets off along guide rails 17 making for the bay 9 which happens to be allocated for palletisation of the article-category in question. At the same time, or on arrival at the bay, the means of alignment 22 brings its fences in together to a predetermined distance so as to centre the layer of single articles directly above the pallet ready for a perfectly-aligned set-down.

Once directly above the appropriate bay,

the bearer-frame descends to a point as near as possible to the level of set-down, and roller-bed 19 is caused to wind out to one side such that the layer of articles may drop gently onto the pallet beneath (in the event that plant incorporates the Fig. 9 embodiment, this will be brought about by roller-sections 19a and 19b winding out either side). Stacking of the pallet to precision, layer on layer, is guaranteed by virtue of means-of-alignment 22 and fence 35 (or fences 36 and 37).

This done, the bearer-frame climbs once more, its rollers winding back across to re-occupy the vacated bearer-platform, and the traverser with its uprights 10 & 16 will return along guide-rails 17 to the former position alongside squaring-device 7 to collect another layer.

The entire cycle of movements performed by this first traverser 10 will be governed by first means of synchronisation which would be electronic for the greater part of applications. Such means involve no particular inventive step, and can be put together with no special trouble by a man skilled in automation—intricacies notwithstanding.

With a pallet in one of bays 9 duly completed, the appropriate signal is given to operate traverser-trolley 23 whose stand-by position will be somewhere in the region of mid-way on guide-rails 24. The trolley is duly traversed to a point alongside the bay 9 accommodating the full pallet, and its sliding platform 25 is extended so as to communicate with the bay (see Fig. 10), whose motorised rollers will start up and transfer the full pallet from bay to trolley. The trolley now retracts its platform 25 and proceeds to a point alongside the outgoing conveyor 2 by traversing guide rails 24, where on arrival, sliding platform 25 is once again extended, its rollers started up, and the full pallet duly despatched from the trolley onto the outgoing conveyor. Traverser 11 now proceeds to bay 12 where empty pallets await collection, and picking one such pallet up, transports it to the bay latterly vacated of said full pallet, and deposits it thereon by extending the trolley-platform as before.

The full cycle as described thus being completed, traverser 11 returns to its stand-by position to await a fresh cycle.

The entire cycle of movements as described for and performed by this second traverser will be governed by second means of synchronisation, for which the same considerations as voiced regarding first such means duly apply.

In addition to the advantages as already described—that is to say, compact dimensions, flexibility of use, automated function—palletising plant as set forth by the invention offers a further important plus-factor, and more precisely, gentler handling of the articles

being palletised, meaning a reduction in the risk of damage thereto. With this plant, friction between article and handling components is minimal, and compressive stress imparted to any single article will never be great, since its movement is brought about by small power-units, and no use is made of push-off rods, bars, frames and so on.

Clearly, a number of features as set forth above might well be embodied differently whilst taking nothing away from the invention's patentability—for instance, conveyors could be of a different basic type, as could the platform described for trolley 23 be substituted by pallet forks.

The method of feeding articles into the plant itself could likewise be other than that described, with perhaps two entirely independent incoming conveyors linked to the entry-conveyor for situations where the same palletising plant is to serve packaging lines turning out widely differing types of article; the two lines could enter at either end of conveyor 3 for instance. Lastly, the actual number of bunker-conveyors and corresponding palletising-bays is unrestricted—being geared quite simply to the number of article-categories being palletised at any one time.

30 CLAIMS

1. Automatic palletising plant for differently-categorised articles of the type designed for stacking goods layer-by-layer on wooden pallets, and comprising an incoming conveyor (1) up-line of the plant itself supplying articles for palletisation; and an outgoing conveyor (2) down-line of the plant onto which filled pallets are despatched, characterised in that it comprises:

40 —an identification device positioned up-line of the plant designed to single out categorised articles and supply the plant with control signals according to type;

45 —an entry conveyor (3) onto which articles arrive from the incoming conveyor aforesaid, provided with a number of stops (4)—corresponding to the number of article-categories being handled—kept normally disengaged, and moved into an engaged position on receipt of an appropriate control signal from the identification device as aforesaid;

50 —a number of bunker-conveyors (5) corresponding to the number of article-categories being handled, whose first ends abutt with the side of said entry-conveyor at respective points slightly forward of said stops such that draw-off of articles along each bunker-conveyor comes about at right-angles to movement of same along the entry-conveyor, and
60 whose remaining ends are furnished with respective check-devices (6) kept normally in engaged position;

—a number of draw-off means corresponding to the number of article-categories being
65 handled, each of which designed to draw a

categorised article off said entry-conveyor and onto said corresponding bunker-conveyor;

—a number of counter-devices—one to each bunker-conveyor—designed to enumerate articles in transit on the latter and relay a relative signal which triggers disengagement of said respective check-device and permits ongoing movement of articles checked thereby from said bunker-conveyor, each time
75 the article-count reaches a given number required to form one pallet-layer;

—a squaring-device (7) designed to arrange articles into the required pallet-layer format and communicating with said bunker-conveyors via a linking-conveyor (8);

80 —a doublecheck counter-device designed to relay a signal enabling disengagement of said check-devices and movement forward of articles from said bunker-conveyors each time the number of articles required for formation into one pallet-layer runs off said linking-conveyor;

—a number of fixed bays (9) corresponding to the number of article-categories being handled, each of which accommodating a single pallet onto which layers aforesaid of a given category are set down in succession one on top of the other;

—a first transverser (10) which brings the
95 arranged layer of articles from the squaring-device to the bay allocated for that particular article and deposits said articles thereon;
—a second traverser (11) which collects full pallets from said bays and transfers them to the outgoing conveyor aforesaid—the same said second transverser also designed to pick up empty pallets from a further supply bay (12) and deposit them at said fixed bays when vacated following collection of said full pallets.
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2. Plant as in claim 1 characterised in that said incoming conveyor is of the motorised roller variety, and in that said stops (4) are disposed within planes perpendicular to the direction of movement along the conveyor itself, remaining below the level of the conveyor-surface in their normally-disengaged position and caused to move through a vertical path so as to assume the stop or engaged position aforesaid, above the level of the conveyor-surface.
115

3. Plant as in claim 1 characterised in that each of said draw-off means comprises a pneumatic actuator cylinder (13) and a blade (14) attached to the free end of the rod of said cylinder which rides over the surface of said entry-conveyor upon actuation of said cylinder through a path normal to the article's path of movement thereon; each said stop being furnished with a transducer (15) designed to relay a control signal bringing about said actuation of said cylinder once having read-off the presence of an article brought to a halt against said stop.
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4. Plant as in claim 3 characterised in that
130

said blade is supported by a fitting 33 made fast to said actuator cylinder-rod and positioned so as not to impede passage of articles along said entry-conveyor; said blade being caused to slide vertically with respect to said fitting.

5 5. Plant as in claim 1 characterised in that each of its bunker-conveyors comprises a number of motorised rollers each fitted with a
10 freewheel device and together creating the conveyor-surface; said rollers functioning as idle members during accumulation of articles on same, and as driving members during exit of said articles therefrom; said check-device
15 (6) disposed within a plane normal to the path of movement along said bunker-conveyor and utilised in a normally-engaged position above said conveyor-surface whilst movable therefrom through a vertical path on receipt of a
20 control signal from both counter- and double-check counter-devices, so as to assume a position offering no obstruction to the path of movement along said conveyor-surface.

6. Plant as claim 1 characterised in that
25 said first traverser comprises a chassis with uprights (16) capable of travelling along first parallel guide rails (17) between which fixed bays aforementioned are located, and a bearer-frame (18) capable of sliding vertically
30 between said uprights whose bearer-platform destined to accommodate said layers of articles consists of a bed of idle rollers (19) designed to slide back and forth with respect to said bearer-frame from/to a first position in
35 which said rollers occupy said bearer-platform to/from a second position in which the latter is vacated by said rollers; and means of alignment (22) mounted to said bearer-frame and designed to centre articles making-up a
40 pallet-layer on said bearer-frame by aligning same within given dimensions.

7. Plant as in claim 6 characterised in that the individual rollers of the bed aforementioned are attached at either end to each one
45 of a pair of chains (20) which when operated wind around into a compartment (21) incorporated into the bearer-frame at one side of said bearer-platform.

8. Plant as in claim 6 characterised in that
50 individual rollers of the bed aforesaid are split up into two sections, the first (19a) of which attached at either end to a pair of chains (20a) which when operated wind around into a first compartment (21a) located at one side
55 of the bearer-frame platform, and the second (19b) attached at either end to a second pair of chains (20b) which when operated wind around into a second compartment (20b) located at the opposite side of said platform to
60 said first compartment; said sections of the roller-bed being caused to wind out in opposing directions one from the other.

9. Plant as in claim 6 characterised in that it comprises height-sensing means designed
65 to read off the maximum height reached by

articles stacked at said bays and to relay a proportional control signal geared to said maximum height which governs vertical climb of said bearer-frame on said traverser-uprights in
70 such a way as causes said climb to cease on arrival at a level slightly in excess of said maximum height.

10. Plant as in claim 1 characterised in that said second traverser comprises a trolley
75 (23) capable of running on second parallel guide rails (24) set out alongside the bays, outgoing conveyor and empty pallet bay aforesaid, and furnished with a sliding platform (25) composed of motorised rollers
80 capable of so sliding at right-angles with respect to the trolley's own traverse-direction and to the trolley itself in such a way as to communicate directly with said bays, with said outgoing conveyor, and with said empty
85 pallet supply bay, each in its turn.

11. Plant as in claim 6 characterised in that it comprises first means of synchronisation, these being electronic and designed to control said first transverser in carrying
90 through the following sequence of operations:

—identification of the category of article making up a pallet-layer presently on the bearer-frame;

—raising-up of said bearer-frame;

95 —propulsion of entire traverser to the point where said bearer-frame overlies the palletising-bay allocated;

—centring of said layer of articles by way of said bearer-frame's means of alignment;

100 —lowering of said bearer-frame;

—winding-out said bearer-platform rollers to the second of said positions thus setting down said layer;

—return of traverser to initial position.

105 12. Plant as in claim 10 characterised in that it comprises second means of synchronisation, these being electronic and designed to control said second traverser in carrying through the following sequence of operations:

110 —identification of the fixed bay at which a full pallet awaits collection, and traverse of the trolley to a point alongside same;

—extension of the trolley's sliding platform to where communication of same with said
115 bay enables receipt of the full pallet;

—retraction of said sliding platform;

—further traverse of the trolley to a point alongside the outgoing conveyor;

120 —extension of said sliding platform to where communication with said outgoing conveyor and start-up of motorised rollers permits and produces exit of the pallet thereonto;

—retraction of said sliding platform;

125 —further traverse of the trolley to a point alongside the empty pallet supply bay;

—extension of said sliding platform to where communication with the bay permits pick-up of a fresh pallet;

—retraction of said sliding platform;

130 —further traverse of the trolley to the same

point as previously permitted communication with the bay from which said full pallet was collected;

—extension of said sliding platform and

5 delivery of pallet;

—retraction of said sliding platform;

—traverse back to the initial position.

10 13. Automatic palletising plant for differently-categorised articles of the type designed for stacking goods layer-by-layer on wooden pallets, substantially as hereinbefore described with reference to the accompanying drawings.

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